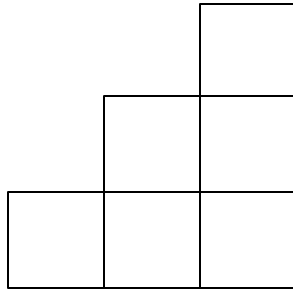


## Problem of the Month

# Growing Staircases

**Level A:**



This is a staircase that goes up three steps.

How many blocks are needed for the first step?

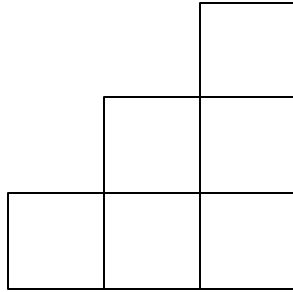
How many blocks are needed for the second step?

How many blocks are needed for the third step?

How many blocks in all are needed to make this staircase of three steps?

Explain how you know.

**Level B:**



Draw the blocks in the diagram to make the fourth step.

How many blocks in all are needed to make a staircase with five steps?

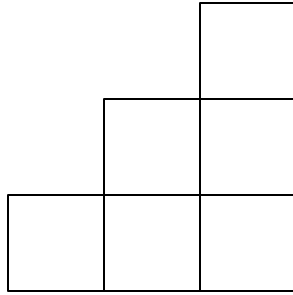
How many blocks does it take to build just the twelfth step?

How many blocks in all are needed to make a staircase of ten steps?

A staircase has 105 blocks, how many stairs does it have?

Explain your answers.

**Level C:**



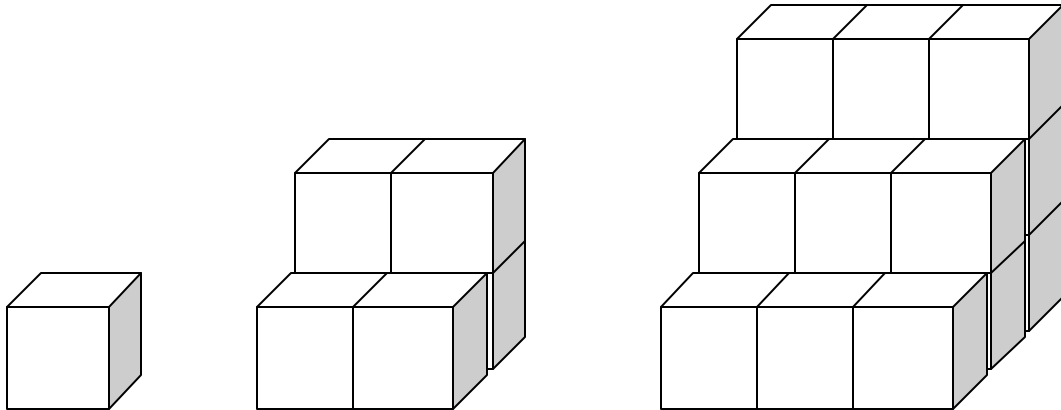
How many blocks are needed to make just the one hundredth step? Explain how you know.

Write a rule to find the number of blocks needed for the  $n$ th step. Explain your rule.

Write a rule to find the total number of blocks needed to make a staircase with  $n$  number of steps. Explain your rule.

Write a rule that given  $y$  number of blocks you can tell how many steps are in the staircase. Explain your rule.

**Level D:**



This set of staircases grows at a different rate.

How many blocks in all are needed to make a staircase with five steps?

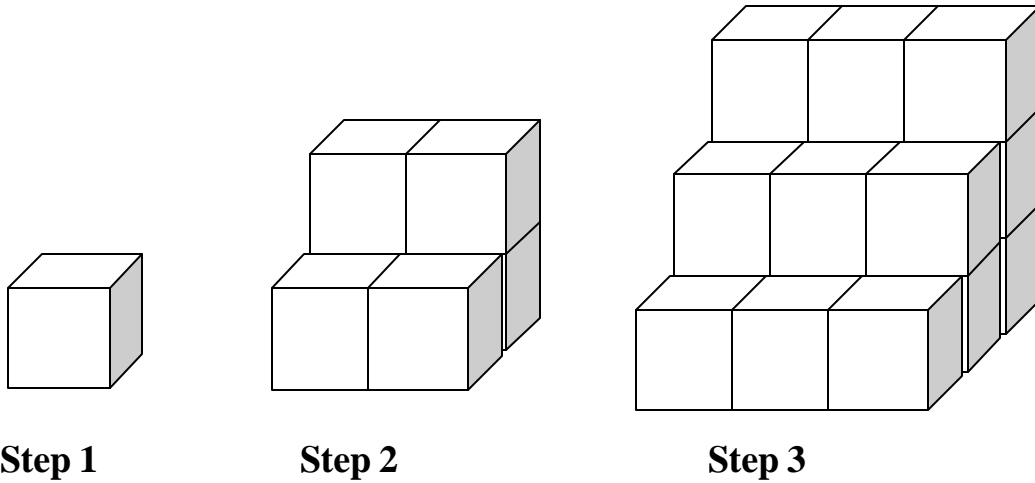
How many blocks make up the top step of a staircase with  $n$  steps?

How many blocks make up the first level (the base) of a staircase with  $n$  steps?

Given a staircase with 30 steps explain a process you might follow to determine the number of blocks necessary to build the staircase.

Explain your answers.

**Level E:**



Using the pattern shown above, find a general (closed) formula to find the number of blocks needed to build a staircase with  $n$  stairs.

Justify why your formula works.

Explain and justify which stages will require an odd number of blocks to build them.

## Problem of the Month

# Growing Staircase

### Primary Version Level A

**Materials:** A picture of the first three staircases and tiles for students to make a staircase

**Discussion on the rug:** (Teacher holds up the pictures of the staircases) "Here are different staircases. How many steps do you take on the first staircase? How many squares do you need to build the first staircase? How many squares do you need to build the second staircase? How many steps do you take on the third staircase?" (Teacher asks questions to have the child think about steps and numbers of squares in growing pattern.)

**In small groups:** (Each student has access to tiles. Teacher asks the following questions. Only go on to the next question if students have success.)

This is a staircase that goes up three steps.

How many squares are needed to build the first step?

How many squares are needed to build just the second step?

How many squares in all are needed to build a staircase of two steps?

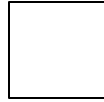
How many squares in all are needed to make a staircase of three steps?

(At the end of the investigation have students either discuss or dictate a response to this summary question.)

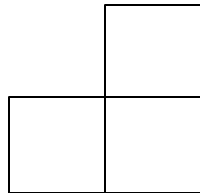
Tell me how you know.

## Problem of the Month

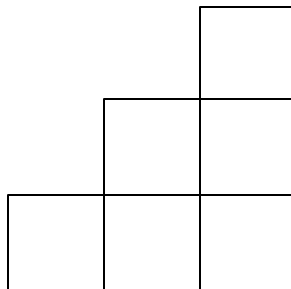
# Growing Staircase



First Staircase



Second Staircase



Third Staircase